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ME 278 (AUG) 3:0

A practical introduction to data analysis for engineers

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Course Description:

- Brushing up of topics in Linear Algebra - Matrix manupilations, solutions of linear equations - LU/QR/SVD/Krylov methods
- Introduction to machine learning - **getting started with TensorFlow/PyTorch**
- Supervised learning - Regressions, classifications, overfitting and generalization
- Unsupervised learning - Clustering, dimensionality reduction, Self-supervised learning
- Introduction to optimization problems - gradient descent, matrix-free methods like CG - **getting stated with scipy.optimize and scipy.sparse.linalg modules**
- Constrained and unconstrained optimization problems - Lagrange multipliers, linear programming, quadratic programming,
- Convex sets, functions and types of convex optimization problems - **getting started with CVX_OPT/CVX_PY**
- Discrete and continuous random variables. Bayes' rule, Gibbs sampling, Bayesian inference - **getting started with pymc**

Prerequisites:

Resources:

1. Probabilistic Machine Learning: An introduction, Kevin P Murphy, The MIT Press [https://probml.github.io/pml-book/book1.html]
2. Linear Algebra and Learning from Data, Gilbert Strang [https://math.mit.edu/~gs/learningfromdata/]

Outcomes:

Course website: